

REMARKS

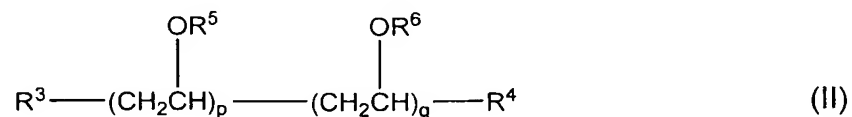
Claims 1, 2 and 4-9 are pending in the present application.

Applicants wish to thank Examiner Stanley for the helpful and courteous discussion with their undersigned Representative on August 4, 2011. During the discussion, the outstanding rejections were discussed in the context of the claims subject to examination and the specification in general. The content of this discussion is believed to be reflected in the amendments and remarks set forth herein. Applicants request reconsideration of the outstanding rejections.

Rejection Under 35 U.S.C. §103

The Office Action rejects claims 1, 2, and 4-9 under 35 U.S.C. §103(a) over U.S. Patent No. 5,518,643 to Egawa et al. ("Egawa '643") in view of U.S. Patent No. 5,801,132 to Kaneko et al. ("Kaneko"). Applicants respectfully traverse the rejection.

Claim 1 recites "[a] A refrigerating oil composition, comprising: a refrigerant (A) comprising as a predominant component a C1-C8 hydrocarbon compound; and a base oil (B) comprising a polyvinyl ether represented by formula (II):



wherein each of R^3 and R^4 represents a hydrogen atom, a C1-C18 hydrocarbon group, or a C2-C18 acyl group; R^5 represents a methyl group; R^6 represents an ethyl group; p is an integer of 1 or more; and q is an integer of 1 or more; wherein the composition satisfies the following conditions: (i) solubility of the refrigerant (A) in the base oil (B) is 40 mass% or less at 40°C and 1.2 MPa; and (ii) mixture viscosity of the refrigerating oil composition is

0.1 mm²/s or more at 90°C and 2.3 MPa" (emphasis added). Egawa '643 and Kaneko do not disclose or suggest such a composition.

As conceded in the Office Action, Egawa '643 does not disclose a composition including a C1-C8 hydrocarbon refrigerant. *See* Office Action, page 4. Instead, Egawa '643 envisions a composition including a polyvinyl ether lubricating oil and a hydrofluorocarbon refrigerant (i.e., a Flon compound). *See, e.g.*, Egawa '643, column 4, lines 10 to 20.

The lubricating oil of Egawa '643 is indicated to have "... excellent compatibility with hydrogen-containing Flon compounds" *See* Egawa '643, column 4, lines 10 to 20 and column 9, lines 5 to 10. By contrast, in the composition of claim 1, the polyvinyl ether base oil and the hydrocarbon refrigerant are mutually miscible to a particular degree (e.g., "solubility of the refrigerant (A) in the base oil (B) is 40 mass% or less at 40°C and 1.2 MPa"). As discussed in the present specification, the miscibility of the refrigerant in the base oil should be as small as possible, because, to the extent that the refrigerant is dissolved in the base oil, the cooling effect is decreased. *See* present specification, page 2, line 5 to page 5, line 3.

Egawa '643 does not disclose a composition including the combination of components recited in claim 1 or having the compatibility requirements of claim 1.

As discussed above, claim 1 requires C1-C8 hydrocarbon refrigerant and a specific polyvinyl ether base oil, while also requiring a specific solubility of the refrigerant (condition (i)) and a specific mixture viscosity of the composition (condition (ii)). In addition to failing to disclose or suggest a composition including a C1-C8 hydrocarbon refrigerant, Egawa '643 does not disclose or suggest a composition in which the particular polyvinyl ether base oil of claim 1 is selected, while retaining properties consistent with conditions (i) and (ii) of claim

1. Moreover, there is nothing in Egawa '643 that would have led a skilled artisan to control conditions (i) and (ii) of claim 1. *See, e.g.*, MPEP §2144.05.II.B (citing *In re Antonie*, 195 U.S.P.Q. 6 (C.C.P.A. 1977) (particular parameter must first be recognized as result-effective variable before determination of workable ranges can be said to be obvious variation)).

Accordingly, even if one of ordinary skill in the art would have been motivated (e.g., in view of the teachings of Kaneko), to employ a C1-C8 hydrocarbon refrigerant in the composition of Egawa '643, the composition of claim 1 still would not be achieved.

The Office Action asserts that it would have been obvious to replace the hydrofluorocarbon refrigerants of Egawa '643 with the hydrocarbon refrigerants of Kaneko, because Kaneko discloses that hydrofluorocarbon refrigerants and hydrocarbon refrigerants are equivalent and interchangeable. *See* Office Action, page 4. In fact, Kaneko discloses that "[t]he refrigerant to be used in refrigerators to which the refrigerator oil composition of the present invention is applied are preferably hydrogen-containing Flon compounds such as hydrofluorocarbons and hydrochlorofluorocarbons." *See* Kaneko, column 15, lines 54 to 58. That is, Kaneko does not indicate that hydrofluorocarbon refrigerants and hydrocarbon refrigerants are equivalent and interchangeable. One of ordinary skill in the art, considering the teachings of Egawa '643 and Kaneko would not modify the compositions of Egawa '643 by employing refrigerants that are indicated to be non-preferred in Kaneko. As is well-settled, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *See* MPEP §2141.02 (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 USPQ 303 (Fed. Cir. 1983)).

Applicants further note that Kaneko discloses that numerous different base oils may be employed. *See, e.g.*, Kaneko, column 2, lines 33 to 34. One of ordinary skill in the art would not have been led to select the particular polyvinyl ether base oil of claim 1 by the

teachings of Kaneko, much less to employ such polyvinyl ether base oil in combination with a C1-C8 hydrocarbon refrigerant and control the resulting composition to have a refrigerant solubility and a specific mixture viscosity satisfying conditions (i) and (ii) of claim 1.

Moreover, Applicants direct the Examiner attention to the fact that Egawa '643 specifically focuses on improving the compatibility between lubricating oils and hydrofluorocarbons. It is also noted that the preferred refrigerants in Kaneko are also hydrofluorocarbons. Thus, even if Kaneko happen to disclose that hydrocarbons are also refrigerants there is no reason why the artisan would ignore the specific teachings in Egawa '643 improving the compatibility between lubricating oils and hydrofluorocarbons to use a hydrocarbon.

It cannot be overlooked that Egawa '643 and Kaneko fail to appreciate that the myriad of problems in the art set forth on pages 1-4 of the specification, much less appreciate that the claimed invention can solve these problems by utilizing a C1-C8 hydrocarbon refrigerant and a specific polyvinyl ether base oil, while also requiring a specific solubility of the refrigerant (condition (i)) and a specific mixture viscosity of the composition (condition (ii)). The discovery of a problem is often the key to making a patentable invention. Thus, the patentability of an invention under 35 U.S.C. §103 must be evaluated against the background of the highly developed and specific art to which it relates, and this background includes an understanding of those unsolved problems persisting in the art solved by the invention. *See, Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 43 S.Ct. 322, 67 L.Ed. 523 (1923).

Applicants further note that Egawa '643 discloses using a polyvinyl ether compound as a base oil. *See* Egawa '643, Abstract. Kaneko, by contrast, discloses using a polyether compound as an additive to a base oil. *See* Kaneko, column 2, lines 5 to 10. Reference

Examples 1 and 2 of Kaneko demonstrate that using a base oil without additives leads to a deterioration in lubrication properties and causes seizure and fatigue. *See* Kaneko, TABLE 1. One of ordinary skill in the art would have been discouraged from replacing the oil composition of Kaneko with the base oil of Egawa '643 in view of the possibility of, e.g., a deterioration in lubrication properties. Accordingly, one of ordinary skill in the art would not have reasonably expected success upon combining the teachings of Egawa '643 and Kaneko as proposed in the Office Action. *See* MPEP §2143.02 (*prima facie* case of obviousness based on a proposed modification to reference will only stand if one of ordinary skill would have had reasonable expectation of success upon making the modification) (citing *In re Merck & Co., Inc.*, 800 F.2d 1091 (Fed. Cir. 1986)).

To further illustrate the differences between the claimed invention and the cited art, Applicants provide the following comparison of the present invention with Egawa '643 and Kaneko:

	Refrigerant	PVE
The present invention	Hydrocarbon (propane)	Me/Et copolymer
Egawa '643	R134a	Et homopolymer (iso-Pr homopolymer)
Kaneko	R134a	Et/Bu copolymer

The examples of the present application themselves correspond to the results obtained by using the refrigerants other than those of Egawa '643 or Kaneko. In addition, the examples show an unexpected result with a composition as claimed as compared to use of an alternative refrigerant that is listed as a preferred species in Egawa '643 and Kaneko et al.

Egawa '643 and Kaneko et al aim at improvement of the compatibility of lubricant oil with refrigerant by heightening the compatibility, on the other hand, the present invention aims at improvement of such compatibility by lowering the compatibility. Therefore, Applicants submit that above merits (lowering compatibility) themselves of the present invention are unexpected results when considering the results (heightening compatibility) of Egawa '643 and Kaneko et al.

Moreover, Applicants again note that one of ordinary skill in the art would have been discouraged from replacing the oil composition of Kaneko with the base oil of Egawa '643 in view of the possibility of, e.g., a deterioration in lubrication properties. Accordingly, one of ordinary skill in the art would not have reasonably expected success upon combining the teachings of Egawa '643 and Kaneko as proposed in the Office Action. *See* MPEP §2143.02.

As explained, claim 1 would not have been rendered obvious by Egawa '643 and Kaneko. Claims 2 and 4-9 depend from claim 1 and, thus, also would not have been rendered obvious by Egawa '643 and Kaneko. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Applicants submit that the present application is now in condition for allowance.
Early notification of such action is earnestly solicited.

Respectfully submitted,

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